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BIOLOGICAL EVALUATION OF SOUTHERN PINE BEETLE INFESTATIONS ON CAMP LEJEUNE MARINE CORPS BASE, NORTH CAROLINA

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ABSTRACT

Aerial surveys and ground checks of 87,000 acres consisting of 42,000 acres of susceptible host show an estimated 162 multiple tree southern pine beetle spots on Camp Lejeune. An estimated 423.2 MBF are currently infested with a potential for an additional 1,270 MBF loss without a control project. A large red cockaded woodpecker population will require special protection during a control project.

INTRODUCTION

On February 22, 1980, the U. S. Forest Service Aerial Survey Team (State and Private Forestry, Doraville, Georgia) in cooperation with the Camp Lejeune Forestry Department conducted a 100 percent southern pine beetle aerial survey of the base (Carothers, 1980). Areas of dead and dying pine were marked on a base map and used as reference for ground checking the week of March 3rd. Sixteen of these spots were randomly selected for ground checking proportionate to spot size class distribution.

SOUTHEASTERN AREA, STATE & PRIVATE FORESTRY
USDA FOREST SERVICE, ATLANTA, GA 30309

At each spot, the number and volume of infested trees were recorded to project total infested volume throughout the base. The aerial survey can only provide for recording red and fading trees. The number of green infested trees were recorded in ground sampled spots, to supply a correction factor for projecting total numbers of infested trees from the aerial survey data.

RESULTS

Table 1 shows results of the aerial survey after application of the correction factor (2.047). The base is heavily infested with 3.86 spots per 1,000 acres of susceptible forest type. The 162 infestations contain an estimated 2,383 currently infested trees comprising an estimated 423.2 MBF of timber. Figure 1 shows areas of heaviest southern pine beetle activity. It is noteworthy that Camp Lejeune supports a large population of red cockaded woodpeckers. This endangered species nests in old growth southern pines and was found proximal to or within some southern pine beetle infestations. Figure 2 shows the location of these woodpecker nesting sites. This information was provided by the Camp Lejeune Base Forestry Department.

Table 1.--Number of southern pine beetle spots and infested trees by spot size class (corrected aerial survey data), Camp Lejeune Marine Corps Base, 1980.

	Spot Size					
	1-10	11-25	26-50	51-100	100+	TOTAL
No. spots	135	0	8	18	1	162
No. trees	346	0	307	1,576	154	2,383

DISCUSSION AND RECOMMENDATIONS

The aerial survey and ground examinations of infestations on the military base show that the current outbreak is in its initial stages. At this time, the infestations are in stressed and weak trees. Some of the stressed trees were man-

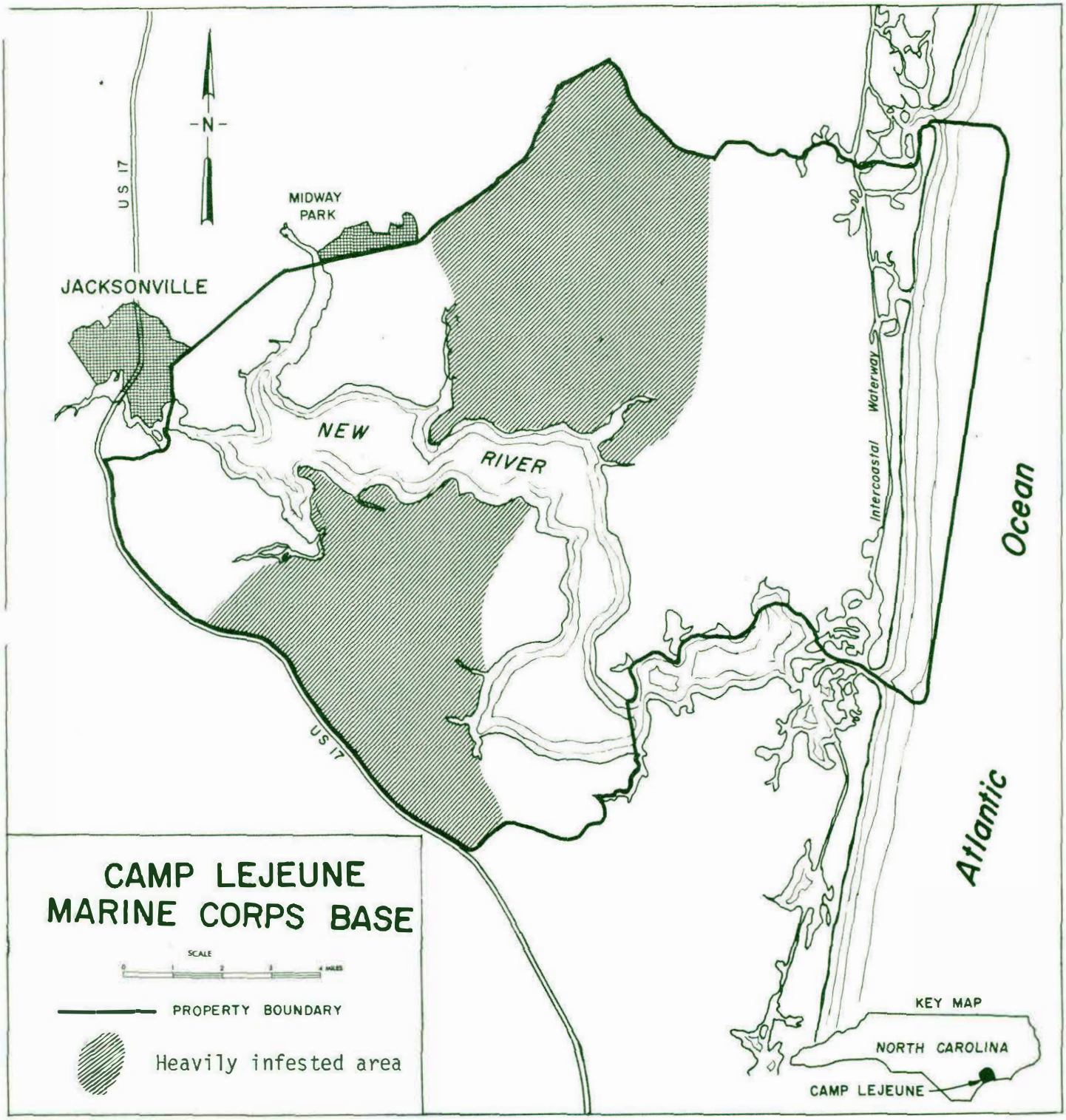

Figure 1.--Location of heaviest southern pine beetle activity.

SOUNDINGS IN METERS

Figure 2.--Location of 22 red cockaded woodpecker colonies.

caused such as, those wounded by climbing spikes used in climbing trees to install communication wire, those in bivouac areas that had been chopped on with axes and hatchets, and those with soil compaction due to continuous foot and vehicle traffic. Certain areas seem to be used repeatedly. Trees were girdled by communication wire where the wire was wrapped around them a number of times and then tied off tightly. Mechanical damage from vehicles and equipment is also a source of stress caused by the scarring and debarking of trees. Numerous stressed trees were found around wet areas and pocosins. This stress is due to either too much water or not enough. This particular problem could have been caused by the drought we had in 1978. If conditions stay ideal for the southern pine beetle, tremendous losses of pine timber could be sustained on the base.

Based on traditional spot growth data for the area, as much as 1,270 MBF could be lost within the next year, if infestations on the base are not controlled. The total loss could be as much as 1,693 MBF (currently infested 423 MBF - the projected 1,270 MBF). Based on individual situations, any of several suppression techniques may be used.

CURRENT SUPPRESSION PROCEDURES

1. Removal of Infested Trees by Commercial Sale or Administrative Use. When infested trees of merchantable size are accessible, they should be removed by commercial sale or administrative use procedures. Logging of the infested material should begin immediately. Contract time limits should insure rapid removal.

   When practical, and if host type is present, a 40- to 70-foot buffer strip should be marked and cut adjacent to and ahead of the most recently infested trees. This practice is effective in reducing the possibility of "breakouts." When only a small volume of infested merchantable material occurs in a spot, noninfested trees surrounding the spot may be marked to provide an operable cut.

   The order of priority of removing beetle-infested timber from a spot should be as follows:

   -- Trees in the buffer zone at the head(s) of the spot - if not removed within 2 weeks of marking, another visit and talley must be made in order to insure removal of all infested trees and an adequate buffer strip.

   -- Trees with fresh attacks and having young broods (usually the green, recently infested trees).

   -- Trees having nearly developed broods (usually the red and fading trees).

   Remove infested trees from Marine Corps Base, Camp Lejeune lands by commercial sale or administrative use procedures in accordance with guidelines and procedures set forth in FSM 2400 through 2490.

2. Piling and Burning. Unmerchantable or inaccessible southern pine beetle infestations can be suppressed by cutting, piling, and thoroughly burning the bark of infested trees. The entire bark surface must be thoroughly burned to insure effective control. The order of priority for cutting, piling, and burning infested trees, particularly the large spots, is the same as paragraph (1) under "Removal of Infested Trees by Commercial Sale or Administrative Use." Cutting a buffer strip is not recommended. To reduce the possibility of "breakouts," every effort should be made to locate and treat all green infested trees during the piling and burning operation.

3. Chemical Control. The chemical formulation recommended for southern pine beetle control is a ½ percent lindane spray with water as the carrier. This may be formulated from a 20 percent lindane emulsifiable concentrate at the rate of 11 pints of concentrate in enough water to make 55 gallons of spray. (Ratio of one part 20 percent lindane EC to 39 parts water.)

Dursban® (chlorpyrifos) is also registered for southern pine beetle control. It is available as a liquid containing 4 pounds of insecticide per gallon of concentrate. The spray is prepared by mixing 2 2/3 fluid ounces of concentrate with water to make 1 gallon or 2.1 gallons of concentrate in 100 gallons of water. Dursban® is to be applied only by or under the supervision of a certified pest control operator or other trained personnel responsible for insect control programs.

Cut, limb, and buck all infested trees into workable lengths. Spray the infested bark surface to the point of runoff. A compressed air sprayer (3-gallon capacity or equivalent) is an ideal applicator. Infested logs must be turned two or three times to insure complete treatment of infested bark. Low pressure sprayers may be used to treat large accessible infestations.

The order of priority for cutting and spraying infested trees in large spots is the same as paragraph (1) under "Removal of Infested Trees by Commercial Sale or Administrative Use." Cutting a buffer strip is not recommended. To reduce the possibility of "breakouts," every effort should be made to locate and treat all green infested trees during the chemical control operation.

Never spray trees from which southern pine beetle brood has emerged. Natural enemies of the southern pine beetle in these trees can then complete their development.

Instructions for minimizing the adverse effects of mixing, transporting and storing pesticides, applying pesticides and disposing of pesticide containers and excess chemicals are outlined in U. S. Marine Corps regulations.

4. Cut-and-leave. This control tactic reduced losses from spot growth and proliferation during the summer months. Cut-and-leave is designed to disrupt spot growth in small to medium-sized spots (40 active trees) by dispersing emerging beeltes. These spots can be salvaged when markets or weather permit. Trees are still suitable for sale months after felling.

The following procedure is to be followed when using cut-and-leave:

(1) Identify all active trees within the spot.

(2) Fell all active trees within the spot.

(3) Fell a horseshoe-shaped buffer of green, uninfested trees around the most recently attacked trees at the head of the spot and leave them lying on the ground with crowns pointed toward the center of the spot. The buffer should be as wide as the average height of the trees in the stand.

Cut-and-leave treatments should only be applied during the summer months between June and October. Spots with 10 or more infested trees should be treated first. As time permits, spots with less than 10 infested trees should also be treated if they contain trees with fresh attacks. In these smaller infestations where a specific head is not distinguishable, an adequate buffer strip (equivalent to the average height of the stand) and all infested and green uninfested trees within the spot should be felled.

Reexamination of Treated Areas. Reexamine areas where infested trees were removed by commercial sales, piled and burned, or chemically treated or cut and left within 2 or 3 weeks after treatment to check for additional infested trees. If additional trees are found, treat them.

In any area where infested trees are cut for chemical control, piling and burning, cut-and-leave or removed through commercial sales and administrative use procedures, stumps adjacent to living pine trees should be treated to control or prevent the root rot Fomes annosus.

Stands that have been previously thinned or have had a history of F. annosus infection, stumps should be treated with the competing fungus, Peniophora gigantea.

Stands that have no history of F. annosus and have never been thinned, the stumps should be treated with borax.

Southern pine beetle infested tree stumps cut during the period of May through August, and below 34° N. latitude do not have to be treated with either of the above materials. This is because few spores are formed during this period and high temperatures often kill spores that are produced. However, routine summer thinning in areas of southern pine beetle buildup is not recommended.

RED COCKADED WOODPECKER CONSIDERATIONS

1. Within colonies and buffer zones, each infested tree will be inspected individually and decisions made as to control measures for that tree; buffers of noninfested trees will not be treated.

2. Active cavity trees will not be cut or sprayed.

3. Dead or apparently live cavity trees from which beetles have emerged will not be cut.

4. Inactive cavities (dead, enlarged by other species, etc.) will not be cut unless a minimum of four cavity trees (active and inactive) per colony remain to provide shelter for a breeding pair of birds and up to two helpers for the interim period necessary for excavation of new replacement cavities.

5. Spraying with presently approved pesticides (Lindane - a chlorinated hydrocarbon, Dursban - an organophosphate) will not be conducted within colonies and buffers--trees cut within these areas will be removed.

6. Cutting of buffers around the head of infestations in contiguous habitat is acceptable unless doing so would separate the colony completely from suitable foraging territory (doughnutting or isolating colonies). In this case, the Camp Lejeune Wildlife Manager should determine if a buffer should be cut and, if so, the modifications of the buffer that should be made considering:

   a. the likelihood of preventing the infestation from entering colony sites by cutting or not cutting the buffer,

   b. the distance from the colony to suitable foraging territory if a buffer is cut (short distances would be crossed by the bird without undue impact), and

   c. the probability of the infestation destroying all or a significant portion of the foraging territory if the buffer is cut versus not cut.

These guidelines were developed by the U. S. Fish and Wildlife Service, Asheville, N.C. and Forest Insect and Disease Management, Asheville, N.C.

PREVENTIVE MEASURES

The preceeding represents only short-term, immediate control strategies. Preventive measures must be taken to help ward off further southern pine beetle infestations in noninfested stands. Some of the more significant preventive measures include:

1. Preventing or minimizing littleleaf disease, a condition which predisposes these weakened trees to beetle attack. Depending on severity of infection, diseased trees may be removed during normal thinnings, on a 6-year cutting cycle or as soon as merchantable. In high-hazard areas or in replanting known littleleaf sites, use loblolly pine or a more resistant tree species, as opposed to shortleaf pine.

2. Harvesting mature and overmature stands. Such stands are vulnerable to beetle attack and should be harvested as soon as possible.

3. Thinning stagnated stands. Overstocked stands are low in vigor and are more likely to be attacked. They should be thinned to a point that trees again show thrift and vigor.

4. Minimizing impact of natural disturbances which causes stand stress. These factors include ice, wind, hail, and animal damage, flooding, erosion, poor soil fertility, etc. Corrective measures include removal of individually damaged trees, wholesale salvage, improving drainage, fertilization, etc.

5. Minimizing or eliminating man-caused disturbances. Logging, pipeline, sewerline, and powerline construction, and other construction activities require use of heavy equipment which causes tree skinning and soil compaction and significantly weakens trees. Efforts to minimize the damaging consequences of these activities can significantly reduce the possibility of their leading to southern pine beetle problems.

PRECAUTIONARY PESTICIDE USE STATEMENT

Pesticides used improperly can be injurious to man, animals, and plants. Follow the directions and heed all precautions on the labels.

Store pesticides in original containers under lock and key--out of reach of children and animals--away from food and feed.

Apply pesticides so that they do not endanger humans, livestock, crops, beneficial insects, fish, and wildlife. Do not apply pesticides when there is danger of drift, when honey bees or other pollinating insects are visiting plants, or in ways that may contaminate water or leave illegal residues.

Avoid prolonged inhalation of pesticide sprays or dusts; wear protective clothing and equipment if specified on the container.

If your hands become contaminated with a pesticide, do not eat or drink until you have washed. In case a pesticide is swallowed or gets in the eyes, follow the first aid treatment given on the label, and get prompt medical attention. If a pesticide is spilled on your skin or clothing, remove clothing immediately and wash skin thoroughly.

Do not clean spray equipment or dump excess spray material near ponds, streams, or wells. Because it is difficult to remove all traces of herbicides from equipment, do not use the same equipment for insecticides or fungicides that you used for herbicides.

Dispose of empty pesticide containers promptly. Have them buried at a sanitary landfill dump, or crush and bury them in a level isolated place.

NOTE: Some states have restrictions on the use of certain pesticides. Check your state and local regulations. Also, because registration of pesticides are under constant review by the U. S. Department of Agriculture, consult your county agricultural agent or state extension specialist to be sure the intended use is still registered.

LITERATURE CITED

Carothers, William A. 1980. Aerial detection survey of southern pine beetle activity, Department of the Navy, Camp Lejeune Military Reservation, North Carolina. USDA - Forest Service, Southeastern Area, S&PF, FIDM, Rep. No. 80-3-9.